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Canada Goose Populations and Harvest in St. Croix County, Wisconsin.

by James O. Evrard
Bureau of Research, Grantsburg

Abstract

Breeding giant Canada geese (*Branta canadensis*), absent since the early 1900s, spread into St. Croix County from nearby Minnesota in 1963. Gosling production peaked in 1987 and then declined, possibly due to drought and increasing hunting harvest. Over 100 geese were captured at the Three Lakes Waterfowl Production Area each year from 1988 to 1991. There were 3 major late summer-early fall concentration sites in St. Croix County which served as small refuges for Canada geese during the hunting season. Fall numbers of up to 2,200 local and migrant geese did not result in nuisance complaints from the public. Hunter success during the first 2 days of the season remained low from 1982 until 1988 when it increased substantially, peaking at 0.41 geese bagged per hunter per day in 1990. The season harvest for St. Croix County also increased substantially during the period. A minimum of 20% of the local geese banded in St. Croix County were eventually shot by hunters. Seventy-three percent of the geese banded in St. Croix County and harvested by hunters, were shot in the county and adjoining Polk and Pierce counties. Another 11% were shot in the nearby Minneapolis-St. Paul Metro area. St. Croix County accounted for the bulk of the Metro-banded geese shot in Wisconsin. Most of the resightings of geese neck-collared in St. Croix County were made in the county, with a few resightings in Minnesota and the southern Illinois-Missouri area where apparently some of the geese winter. Most of the geese do not migrate but winter in open-water areas in the county including the St. Croix and Willow rivers. Although Canada geese breeding in St. Croix County originated from the Minneapolis-St. Paul Metro flock, they have not grown to nuisance numbers like the Metro flock has.

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Introduction

The history of Canada geese (*Branta canadensis*) breeding in Wisconsin was first summarized by Hunt and Jahn (1966) and more recently by Wheeler and Cole (1990). Canada geese were originally common breeders in the state but largely disappeared by the early 1900s due to habitat loss and uncontrolled hunting (Kumlien and Hollister 1903). Efforts to restore the local breeding populations of Canada geese in Wisconsin and elsewhere have been successful, even too successful in urban areas such as Milwaukee and Green Bay, where the geese are now considered nuisances (Bergquist et al. 1993, Wheeler and Cole 1990.)

The first modern record of Canada geese nesting in St. Croix County occurred in 1963 (Faanes 1981). The following year, 2 broods were observed in the county, one on Lake Mallalieu in the City of Hudson and one on the Burkhardt Mill Pond a few miles farther east (Hunt and Jahn 1966.) Both bodies of water are impoundments on the Willow River (Fig. 1). The origin of these geese was most likely Afton, Minnesota.

The Afton flock originated from 15 giant Canada geese (*B. c. maxima*) released in 1960 on the Charles H. Bell estate located on the Minnesota side of the St. Croix River about 5 miles southwest of Hudson (Hawkins 1970). Twelve additional geese were released in 1962. Nine nests were found in 1964, the same year that the goose broods were first observed east of the St. Croix River in St. Croix County, Wisconsin. An additional source of geese could have been the L. W. Hill farms located about 8 miles northwest of Hudson between Stillwater and Maplewood, Minnesota. Breeding geese gradually spread east in St. Croix County and into adjacent Polk and Pierce Counties to the north and south in Wisconsin.

This study was a part of a larger research project conducted from 1982-91 to evaluate management techniques for increasing waterfowl and pheasant production in the pothole region of northwest Wisconsin (Evrard and Lillie 1987). I documented local Canada goose populations and harvests in St. Croix County and attempted to determine their relationships to potential nuisance problems. I also attempted to determine the relationship of local Canada geese in St. Croix County to the Minneapolis-St. Paul Metropolitan (Metro) flock in adjacent Minnesota. The Metro goose flock numbered 25,000 birds in 1989 (Minn. Dep. of Nat. Resour. 1989) and has grown to a point where the geese have become agricultural and urban nuisances (Cooper 1987).

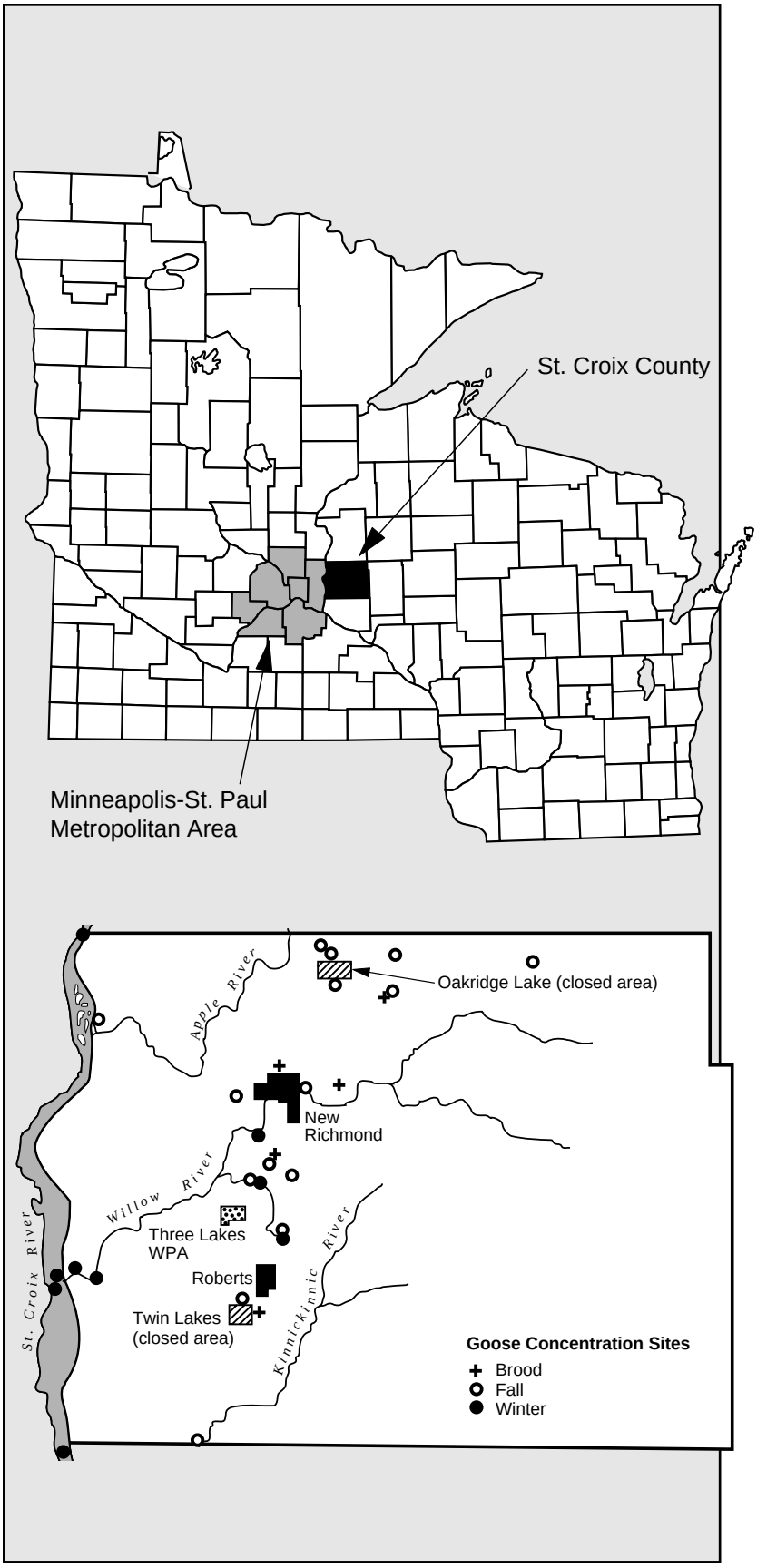

Figure 1. *Study area map of St. Croix County.*

Study Area

The physical characteristics of St. Croix County are discussed in depth in a forthcoming publication (Evrard in prep.). Briefly, soils are sandy loams derived from glacial till overlying sandstone and dolomitic limestone bedrock (Langton 1978). St. Croix County has cold, snowy winters and warm, humid summers with mean annual precipitation of 29.5 inches and a mean temperature of 44.1 F.

Much of the pre-settlement prairie and woodland have been converted to agriculture. Today 75% of the county is intensively farmed for corn, soybeans, oats, and alfalfa with emphasis on dairy production. Of the remaining land area, 13% is wetlands and 11% is wooded (Fig. 2). Approximately 6,000 acres of the county are in state and federal wildlife management areas managed until recently by the Wisconsin Department of Natural Resources (DNR).

Methods

I censused Canada goose breeding pairs in early May each year from the air using the fixed-wing aircraft, pilot, and observer that conducted the annual Wisconsin waterfowl breeding survey (Hunt et al. 1982). The county was surveyed using 10 random, east-west, 20-mile-long, 1/4-mile-wide transects, flown at an altitude of 100-200 ft in Cessna 180 or 185 aircrafts. We also censused selected waterfowl management areas from the ground (Bennett 1967, Dzubin 1969) for Canada goose pairs, nests, and broods each May and June. In addition, observations of goose breeding activities were recorded during the course of other field work of DNR personnel.

Young and adult Canada geese were captured while flightless in late June and July by drive-trapping (Cooch 1953) and night-lighting (Cummings and Hewitt 1964) in late June and July. Geese were fitted

with standard U.S. Fish and Wildlife Service (USFWS) aluminum leg bands and, beginning in 1988, colored plastic neck collars (Sherwood 1966). We attempted to neck collar 100 geese annually as part of a statewide study of giant Canada geese (Wheeler 1992). The neck collars had alphanumeric codes unique to individual geese. Collar codes and colors were recorded when the marked geese were resighted.

Hunters were interviewed in St. Croix County during the first 2 days of the 1982-91 goose hunting seasons. DNR crews drove through the county beginning at the noon opening of the first day of the season and in the early morning of the second day.

Hunters encountered were asked if they had bagged any geese and how many hours they had hunted. Any geese bagged were checked for the presence of bands and the sex and age were determined (Hanson 1967). Canada geese subspecies, based upon size differences, were also recorded.

Hunter success was determined by dividing the total number of geese checked on the first 2 days of the season by the number of hunters interviewed. Hunter effort was determined by calculating the number of hours hunted to bag a bird. Total season kill was derived from DNR and USFWS reports.

Federal mid-December and mid-January goose counts at known and suspected roosting sites were made from aircraft and from the ground by DNR personnel. Open-water areas of the Kinnickinnic, Apple, Willow and St. Croix rivers were censused along with several spring ponds.

Results And Discussion

Population

The population peaked in 1987 and declined in later years (Table 1). Numbers of breeding Canada geese were below levels perceived as nuisances by the public (K. M. Belling, DNR, pers. comm.).

The density of nesting Canada geese was low throughout St. Croix County but goose broods concentrated in a few areas. The Three Lakes Waterfowl Protection Area (WPA) had the largest concentration of broods (Fig. 1). The WPA consists of 4 connected wetlands with 3 owned by the USFWS and the fourth and largest owned by a farmer. The area's attractiveness to Canada geese was the closely grazed shoreline of the privately-owned wetland. More than a hundred geese were captured there annually during drive-trapping operations in 1987-91. Geese were also captured at several other wetlands in St. Croix County supporting smaller numbers of broods.

J. COLE

Figure 2. *Aerial view of St. Croix County landscape.*

Marking

A total of 784 local geese were marked with leg bands from 1983 to 1991 in St. Croix County (Table 2). In addition to leg bands, 380 geese were marked with neck collars during 1988-91. The number of geese captured declined recently after peaking in 1988 and 1989. Another 110 previously marked geese were recaptured.

A minimum of 369 collared geese (97%) were resighted at least once after marking. Even with the possibility of a 3% resighting error (Weiss et al. 1991), the geese apparently suffered little mortality associated with capture, sexing and aging, banding, and neck collaring.

Some neck collars were lost. These birds were recaptured in subsequent years with leg bands but without neck collars. There was a minimum collar loss of 3% for the geese collared during 1988-91. Of the 13 neck collars lost in this study, 8 were lost in the first year following collaring, 4 in the second year, and one in the third year.

Although Samuel et al. (1990*a*) cautioned against drawing conclusions from small sample sizes and relatively short-term studies, the first year collar loss rate in this study (2%) appeared to be lower than the 7% reported by Zicus and Pace (1986) and 21% and 24% reported by Craven (1979) and Fjetland (1973), respectively.

Fall Concentration Sites

Few Canada geese were seen in St. Croix County in late June and July. During their annual molt they used wetlands having dense stands of emergent vegetation where their visibility was low and security high. By mid-August, flight feathers of adult geese were replaced and young geese began to fly. Small flocks of geese were again seen flying about the county.

In recent years, the geese began to concentrate in late August and early September on freshly harvested sweet corn fields near New Richmond. The geese were attracted by the sweet corn residue and newly sprouted rye planted in harvested fields to reduce soil erosion. More than 700 Canada geese have been observed feeding as a group in the fields at one time. During this period the geese roosted in wetlands near New Richmond (Fig. 1).

When the hunting season began, the Canada geese spent most of their time in New Richmond, the Oakridge Lake Closed Area, and on several nearby private wetlands closed to hunting. Migrant geese, identified by neck collars and smaller size, made their appearance in mid- to late-September in most years, using the same areas as the resident geese. Migrant Canada geese arrive in the Horicon, Wisconsin area in late September-early October (Bergquist et al. 1993).

Another fall concentration of local and migrant Canada geese was found in southwestern St. Croix County. These birds fed in agricultural fields south of New Richmond and used small wetlands in that area including the Three Lakes WPA. Peak numbers of geese in this concentration have exceeded 500 birds. With the exception of one private pond, the area was open to hunting and was used little by geese when the season opened.

The third fall goose concentration in St. Croix County was the Twin Lakes Closed Area and surrounding small wetlands near Roberts (Fig. 1). Peak populations have exceeded 1,000 geese in this area during the hunting season. Local and migrant geese using the area south of New Richmond moved into the Twin Lakes Closed Area after the hunting season opened.

Peak Canada goose numbers in St. Croix County in the fall have ranged from 500 in 1983 to 2,200 in 1985 (Table 3). In recent years, the peak population has fluctuated from 1,000 to 2,000 birds. The dates on which the peak populations have been observed also fluctuated from September to November.

Table 1. *Local Canada geese populations, St. Croix County, 1982-91.*

Year	Young	Yearlings and Adults	Total
1982	64	88	152
1983	29	39	68
1984	10	28	38
1985	225*	380*	605*
1986	123	127	250
1987	1,050*	500*	1,550*
1988	750*	500*	1,250*
1989	287	190	477
1990	250*	300*	550*
1991	90	191	281

*Estimates.

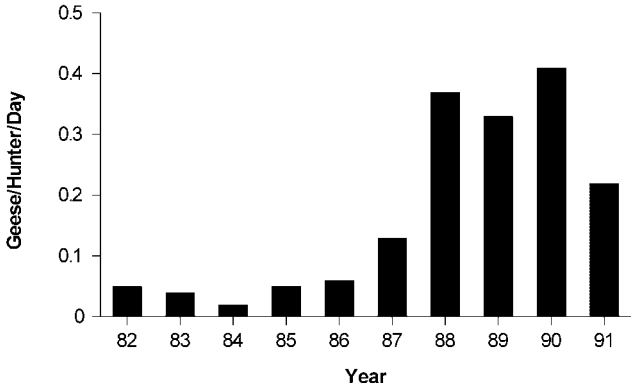

Figure 3. *Canada goose harvest during the first 2 days of the hunting season in St. Croix County.*

Harvests

Hunter success was low during the first 2 days of the 1982-86 seasons, varying from 0.02 to 0.06 geese bagged/hunter/day. In 1985, over 200 hours of hunting effort were expended to bag a single goose. During the period, only one of 29 geese checked appeared to be a subspecies other than the giant subspecies.

By 1987, hunting success doubled and nearly tripled to 0.37 geese/hunter/day (trip) in 1988, the last year the goose season opened concurrently with the duck season (Fig. 3). Only 8 hours of hunting were needed to bag a goose in that year. Beginning in 1988, migrant subspecies of the Canada goose, including *B. c. interior* and *hutchinsii*, were checked in the hunter's bag. Hunter success remained high at 0.33 and 0.41 geese/hunter/trip in 1989 and 1990, but declined to 0.22 geese bagged/trip in 1991. Comparable success rates were 0.33 geese/trip for Grand River Marsh in southern Wisconsin during 1977-81 (Wheeler and Hunt 1994) and 0.44 geese/trip in the entire Central Zone in Wisconsin during 1979-81 (Rusch and Wetzel 1983).

Beginning in 1989, goose hunting seasons opened earlier than the duck seasons, usually in the third week of September. Few geese were bagged by hunters on the opening week of the duck season when the goose season had already been open for 2 weeks.

The Canada goose harvest for the entire season in St. Croix County, based upon federal estimates, also apparently increased from 1982 to 1991 (Fig. 4). A questionnaire sent to a small sample of federal duck stamp buyers was used to generate the federal goose harvest estimates. There is a lack of agreement, however, between the federal and state estimates of the county's season goose harvest. Mandatory goose hunting permits and harvest reporting in Wisconsin were first required in 1988 (Bergquist and Dhuey 1990). Harvest estimates were generated by the DNR from the goose harvest

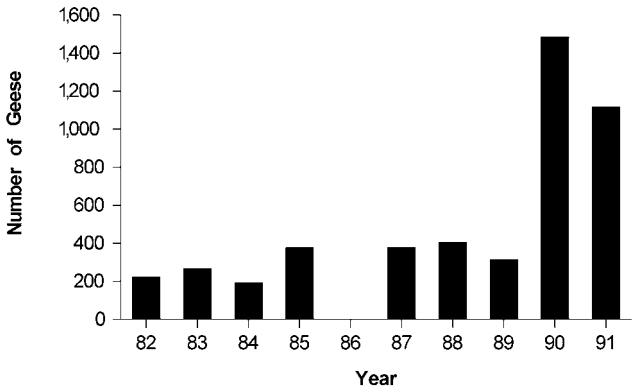

Figure 4. *Canada goose harvest during the hunting season in St. Croix County.*

Table 2. *Number of local Canada geese captured, banded and collared, St. Croix County, 1982-91.*[a]

	Banded			Total	
Year	Adults	Young	Total	Recaptures	Captures
1982	0	0	0	0	0
1983	1	0	1	0	1
1984	0	0	0	0	0
1985	0	0	0	0	0
1986	7	31	38	0	38
1987	45	119	164	7	171
1988	36	154	190 (100)[b]	22	212
1989	34	150	184 (100)	28	212
1990	21	81	102 (88)	19	121
1997	14	91	105 (92)	34	139
Totals	158	626	784 (380)	110	894

[a] A total of 64 geese were banded from 1973 to 1981.

[b] Numbers in () are geese that were neck-collared in addition to banding.

Table 3. *Peak fall and winter Canada geese concentrations and federal winter Canada geese population estimates, St. Croix County, 1982-91.*

Year	Season	Date	Peak Number
1982-83	Fall	4 Oct	746
	Winter	1 Dec	80
1983-84	Fall	20 Sep	531
	Winter	1 Jan	60
1984-85	Fall	14 Nov	573
	Winter	22 Feb	153
		Mid-Jan	64
1985-86	Fall	6 Oct	569
	Winter	Mid-Dec	40
		Mid-Jan	350
1986-87	Fall	3 Nov	2,200
	Winter	Mid-Dec	723
		Mid-Jan	925
1987-88	Fall	28 Sep	1,211
	Winter	Mid-Dec	258
		Mid-Jan	1,198
1988-89	Fall	3 Nov	1,875
	Winter	7 Dec	1,475
		Mid-Dec	1,766
		Mid-Jan	1,080
1989-90	Fall	15 Nov	500
	Winter	12 Feb	550
		Mid-Dec	2,153
		Mid-Jan	3,587
1990-91	Fall	29 Oct	1,156
	Winter	7 Feb	500
		Mid-Dec	4,275
		Mid-Jan	355
1991-92	Fall	18 Sep	550
	Winter	Mid-Dec	925
		Mid-Jan	915

report cards. For example, the state estimated 514 Canada geese were shot in St. Croix County in 1989 while the federal estimate was 315 birds. In 1990, the estimates were more divergent. The state's harvest estimate was 492 geese while the federal estimate was 1,486, up almost 5 times over their estimate of the previous year. With this in mind, the only value of the annual federal goose harvest estimates lies with general trend information rather than absolute numbers.

The hunting seasons were reduced from 30 and 50 days in 1982 and 1983 to just 20 days from 1984 to 1987. During 1988-91, daily bag limits were raised from one to 2 geese and hunting season lengths increased dramatically to 90 days by 1991.

Band Recoveries

Based upon the unadjusted recovery rate (not adjusted for reporting rate), hunters shot a minimum of 169 (19.4%) of the 848 local geese banded within the study area during 1973-91. Of those shot, 7.3% were recovered the first year after banding (direct recoveries) and the other 12.4% were recovered in years following the year of marking (indirect recoveries). Another 9 bands were recovered (6 direct and 3 indirect) from birds that died from causes other than hunting.

The mean direct recovery rates for adult males (7.5%), immature males (8.1%), and immature females (7.2%) did not differ but the rate for adult females (2.6%) was lower ($X^2 = 4.96$, df = 1, $P = 0.03$). The combined direct recovery rate for adults was 5.1% and for immatures, 7.6%.

Pooled sex and age direct recovery rates were low in 1987 and 1988, 3.6% and 2.6% respectively, the first 2 years in which there was an adequate sample of banded birds. Beginning in 1989, the direct recovery rate increased dramatically to 11.8% and remained at 10.8% in 1980 and 12.4% in 1991.

There apparently was some selectivity by hunters in this study for neck- collared geese over leg-banded geese or hunters reported neck collared geese at a higher rate than leg-banded geese. The mean direct recovery rate for birds marked in this study was higher, although not significantly ($X^2 = 3.15$, $P = 0.08$, $n = 785$) for leg-banded and neck-collared geese (9.0%) than for leg- banded-only geese (5.4%) during the years 1986-91. This agrees with conclusions reached by Samuel et al. (1990*b*) who found that reporting rates by hunters were higher for neck-collared geese than for leg-banded birds. However, the combined unadjusted direct and indirect recovery rates were similar ($X^2 = 0.22$, $P = 0.63$, $n = 785$) for neck collared geese (18.4%) and leg banded geese (20.0%).

Of the local geese banded in St. Croix County and shot by hunters, 123 (73%) were recovered in the county and adjacent townships of Polk and Pierce counties. The remaining birds were bagged in Minnesota (13%), Wisconsin (2%), Missouri (6%), Illinois (3%), Iowa (1%), Saskatchewan (1%), and Utah (1%). Most of the Minnesota recoveries were from the 7 counties surrounding that make up the Minneapolis-St. Paul Metro area.

St. Croix County was a primary recovery area for geese banded in the Minneapolis-St. Paul Metro area. Most of the hunting mortality of the Minnesota Metro goose flock occurred outside of Minnesota, primarily in Wisconsin (Cooper and Sayler 1974). Nearly all (96%) of the Minnesota geese recovered in St. Croix County were banded in the Metro area, including Afton.

Zicus (1987) reported 42% of the 69 giant Canada geese banded in Minnesota and recovered in Wisconsin from 1963 to 1985 were shot in St. Croix County. Another 13% were recovered in adjacent counties in northwest Wisconsin.

I determined the origin and time of marking for 21 of 25 Canada geese leg banded elsewhere but recovered in St. Croix County. Of these recoveries, 13 were shot in the fall and 11 were recaptured in the summer as flightless birds. The remaining goose was found dead in the spring. One goose was banded in Arkansas in the winter and recaptured in the summer in St. Croix County. Of the 20 birds that were banded in the summer, 10 were from Wisconsin, 7 from Minnesota, 2 from Arkansas, and one each from Illinois and Iowa. These birds may represent geese migrating to St. Croix County to molt.

Collar Resightings

There were a total of 1,628 resightings of local geese collared in this study with all but 71 observations (4%) made in St. Croix and adjoining counties. Of the 71 resightings outside of St. Croix County, 63 were from Illinois, 7 from Wisconsin, and one from Missouri.

The origin of marking was obtained for 138 of 149 neck-collared Canada geese marked elsewhere but resighted in St. Croix County. Of the 138 geese, Wisconsin was the origin of 36% of the birds, Minnesota 25%, Manitoba 13%, and the balance were from Missouri, Illinois, Arkansas, Mississippi, Kentucky, Kansas, and Tennessee.

Time of marking was obtained for 91 of the 149 foreign geese resighted in this study. No geese were marked in the spring (1 Mar - 31 May) but 65 birds were collared in the summer (1 Jun - 31 Aug), 15 in the fall (1 Sep - 30 Nov), and 11 in the winter (1 Dec - 28 Feb). Of 167 resightings of the foreign geese, 69% were made in the fall with 18% made in the winter and 11% in the spring. Only 2% of the resightings were made in the summer, possibly representing St. Croix County geese captured and marked elsewhere during their molt migration.

An analysis of the resightings suggest summer-marked giant Canada geese from Wisconsin and Minnesota used St. Croix County during fall and spring migration and some wintered in the area. Geese marked in Manitoba passed through St. Croix County during migration with a few apparently remaining for the winter. A few giant Canada geese from Illinois also apparently passed through St. Croix County on their molt migration to the north. Canada geese collared in the winter in southern states were observed in St. Croix County primarily in the fall with a few observations made during the winter.

Winter Concentration Sites

Limited banding returns and neck-collar observations from geese marked in St. Croix County suggest that when lakes and ponds were locked in ice and deep snow covered the ground some geese migrated south to Missouri and southern Illinois.

However, many geese remained in St. Croix County through the winter and have been increasing in numbers in recent years. These birds were joined by geese produced in Minnesota, other Midwestern states, and in some cases, Canada. Peak winter numbers have increased dramatically from a low of 60 geese during 1984-85 to over 3,500 birds during 1989-90, a mild winter (Table 3).

By comparison, an average of 2,100 (range = 400-4,300) geese have been recorded each year in the Minneapolis-St. Paul Metropolitan area in mid-December during 1980-85 (Minn. Dep. of Nat. Resour. 1987).

The Canada geese winter wherever open water is available on the St. Croix River and Willow River plus several spring ponds. The geese feed in adjacent uplands when snow depths permit access to waste corn in harvested fields, in spread manure or in cattle feedlots (Fig. 5). The birds also feed in open water on submergent vegetation.

Summary

Nesting giant Canada geese were observed in 1963 in St. Croix County after an absence of more than 50 years. Production increased until 1987 then declined, possibly due to a combination of 1987-88 drought-induced habitat reduction and increasing hunting harvests. Banding returns indicate that approximately 20% of the geese banded in St. Croix County are eventually harvested by hunters, mostly in St. Croix and adjacent Polk and Pierce counties, Wisconsin.

Canada geese nesting in St. Croix County are, in reality, part of the adjacent Minnesota Metro goose population. The origin of St. Croix County geese was Minnesota and the relationship with Minnesota continues. Significant numbers of Canada geese raised on the Wisconsin side of the St. Croix River are shot in Minnesota and the converse is true. St. Croix County geese wintering on the St. Croix River intermingle with Minnesota birds, but have not reached nuisance population levels like their counterparts in the Minnesota Metro area.

Management Implications

Liberal hunting seasons, in terms of long length, generous daily bag limits, and early openings, and the lack of large areas closed to hunting may have helped prevent the population of breeding Canada geese in St. Croix County from reaching nuisance levels. These liberal seasons should continue.

B. BACON

Figure 5. *Canada geese feeding in winter in cattle feedlot.*

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About the Author

James Evrard is a Wildlife Research Biologist with the Wisconsin Department of Natural Resources, Box 367, Grantsburg, WI 54840.

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